of a patient comprising an acoustical device for receiving less than the actual air volume exhaled and inhaled adapted to be positioned on the face of the patient in the vicinity of the nose and/or mouth of the patient and having at least one acoustic space adapted to receive respiratory air flow from the patient, a change sensing sensor exposed to the acoustic space for sensing turbulence and/or pressure changes and/or sound in the respiratory air flow in the acoustic space and providing an electrical output signal, means processing the electrical output signal including means for providing an estimated volume of air flow to provide a real-time signal indicative of breathing of the patient, means coupled to said space for introducing a flow of oxygen into said space for supplying oxygen to the patient[,] and an ambient sensor in communication with said space but spaced away from said [changing] change sensing sensor to minimize acoustical and mechanical coupling, said ambient sensor being exposed to the flow of oxygen into said space producing an electrical output a signal which is proportional to the flow of oxygen which is combined with the electrical output signal from the change sensing sensor to minimize the effect of the oxygen flow in sensing the respiratory air flow into the patient.

B1

5. (Twice Amended) [Apparatus as in Claim 1 further comprising] Apparatus for breath monitoring by sensing respiratory air flow from the nostrils of the nose and/or the mouth of the face of a patient comprising an acoustical device for receiving less than the actual air volume exhaled and inhaled adapted to be positioned on the face of the patient in the vicinity of the nose and/or mouth of the patient and having at least one acoustic space adapted to receive respiratory air flow from the patient, a change sensing sensor exposed to the acoustic space for sensing turbulence and/or pressure changes and/or sound in the respiratory air flow in the acoustic space and providing an electrical output signal, means processing the electrical output signal including means for providing an estimated volume of air flow to provide a real-time signal indicative of breathing of the patient, an additional sensor in the form of a microphone adapted to be positioned in the vicinity of the nose and/or mouth of the patient and out of communication with the acoustic space for measuring ambient sounds including respiratory sounds in the vicinity of the nose and/or mouth and providing an electrical output signal, means [for] combining the output signals from the first named and additional sensors for reducing ambient noise signals from the signal of the first-named sensor and means utilizing the combined electrical output signals for recognizing disordered breathing patterns.

B2

15. (Twice Amended) A method for measuring respiratory air flow from the nostrils of the nose and/or the mouth of a patient by the use of an acoustical device for receiving less than the

B3

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actual air volume exhaled and inhaled by the patient and adapted to be positioned on the face of the patient and in the vicinity of the nose and/or mouth of the patient and having at least one acoustic space adapted to receive respiratory air flow from the patient comprising sensing turbulence and/or vibration and/or sound in the acoustic space and providing an electrical signal <u>serving as the sole indication for respiratory air flow from the patient</u> and processing the electrical signal to provide an estimated volume of air flow to provide a real-time indication of actual respiratory flow from the patient.

B3

16. (Twice Amended) [A method as in Claim 15 further including the step of] <u>A method for measuring respiratory air flow from the nostrils of the nose and/or the mouth of a patient by the use of an acoustical device for receiving less than the actual air volume exhaled and inhaled by the patient and adapted to be positioned on the face of the patient and in the vicinity of the nose and/or mouth of the patient and having at least one acoustic space adapted to receive respiratory air flow from the patient comprising sensing turbulence and/or vibration and/or sound in the acoustic space and providing an electrical signal and processing the electrical signal to provide an estimated volume of air flow to provide a real-time indication of actual respiratory flow from the patient,</u> sensing respiratory sounds and ambient noise in the vicinity of the face of the patient and providing an additional electrical output signal, [and] combining the first named and additional electrical output signals to provide a combined signal which is substantially free of respiratory sounds and ambient noise and utilizing the combined signal to provide a real-time indication of actual respiratory air flow in which the effects of respiratory sounds and ambient noise have been minimized.

B4

26. (Amended) Apparatus for breath monitoring by sensing respirator air flow from the nostrils of the nose and/or the mouth of the face of a patient comprising an acoustical device for receiving less than the actual air volume inhaled and exhaled adapted to be positioned on the face of the patient in the vicinity of the nose and/or mouth of the patient and having at least one acoustic space adapted to receive respiratory air flow from the patient, a sensor exposed to the acoustic space for sensing turbulence and/or pressure changes and/or sound in the respiratory air flow in the acoustic space and providing an electrical output signal <u>serving as the sole means for sensing respiratory air flow from the patient</u> and [including] means <u>for processing the electrical signal including means</u> for providing an estimated volume of air flow [for processing the electrical signal indicative] <u>to provide</u> in real time <u>a signal indicative</u> of actual air flow to and from the patient.

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B4

27. (Amended) [Apparatus as in Claim 26 further including] Apparatus for breath monitoring by sensing respirator air flow from the nostrils of the nose and/or the mouth of the face of a patient comprising an acoustical device for receiving less than the actual air volume inhaled and exhaled adapted to be positioned on the face of the patient in the vicinity of the nose and/or mouth of the patient and having at least one acoustic space adapted to receive respiratory air flow from the patient, a sensor exposed to the acoustic space for sensing turbulence and/or pressure changes and/or sound in the respiratory air flow in the acoustic space and providing an electrical output signal and including means for providing an estimated volume of air flow for processing the electrical signal indicative in real time of actual air flow to and from the patient, means for applying rule-based decisions to the estimated volume of air flow by employing a set of time varying coefficients adapted to a predetermined breathing pattern to provide a classified output[,] and means utilizing the classified output in scoring an event upon cessation of normal breathing of the patient for greater than a predetermined period of time.

REMARKS

Applicants have amended Claims 2, 5-8, 16-19, 21, 23-24 and 27-28 so they are no longer depended upon a rejected base claim. It is assumed that these claims are now allowable.

The remaining Claims 1, 3-4, 9-15, 20, 22 and 25-26 have been amended to clearly define invention over Bowers et al. 4,802,485. The Examiner argues that Bower et al. disclose the use of a microphone 98 to sense air flow and providing additional combined real time signal indicative patient breathing and relies upon the general statement appearing in col. 3, lines 39-43, to the effect that the output signals from the signal processor 26 can be applied to an A/D converter for real time sampling and analysis by a computer system. First it should be pointed out that the microphone 98 in Bowers et al. is utilized for indicating whether or not the subject is snoring (col. 6, lines 36-37). Thus it can be seen that the microphone 98 is utilized for detecting sound created by snoring. Typically snoring is a result of an obstruction in the airway and when snoring is occurring the microphone output signal is amplified but, on the contrary, there is reduced airflow. The methodology proposed by Bowers et al. is not designed to selectively pick up respiratory airflow signals. In fact Bowers et al. point out to improve the responsiveness of the microphone 98 to snoring sounds, pressure relief grooves 72 are provided to reduce the sounds of breathing and that the grooves 72 in the opening 70 improve responsiveness to snoring sounds (col. 6, lines 37-40). Thus it can be seen that the microphone 98 is not used for sensing air flow. Rather Bowers et al. utilizes a piezo-electric film 78 in the breathing sensor 14 for generating voltages in

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